and the polar water to lie nearer to the surface in this ocean than in the North Atlantic, that therefore this proves the truth of his theory. This condition of matters is just as consistent with my theory as with his. When we consider the immense quantity of warm surface water which, as has been proved,* is being constantly transferred from the South into the North Atlantic—a quantity which to a large extent is compensated by cold currents from the Antarctic regions—we readily understand how the polar water comes nearer to the surface in the former ocean than in the latter. In fact the whole phenomena is just as easily explained upon the principle of under-currents as upon Dr. Carpenter's theory.

Dr. Carpenter lays considerable stress on the important fact established by the *Challenger* expedition, viz. that the great depths of the sea in equatorial regions are occupied by ice-cold water, while the portion heated by the sun's rays is simply a thin stratum at the surface. It seems to me that it would be difficult to find a fact more hostile to his theory than this. Were it not for this upper stratum of heated water there would be no difference between the equatorial and polar columns, and consequently nothing to produce motion. But the thinner this stratum is the less is the difference and the less there is to produce motion. I have been favoured by the Hydrographer to the Admiralty with a series of temperature soundings taken along the equator, and from these I find that to so small a depth does the super-heating extend that the surface of the ocean at the equator requires to stand only four and a half feet above that at the poles in order to the ocean being in perfect equilibrium. In this case if we suppose, in order to constant circulation, that the polar column is kept in excess of the equatorial by the weight of say two feet of water, there would then remain only a slope of two and a half feet between the equator and poles.

There is another point to which, with some reluctance, I am compelled to refer. Dr. Carpenter is continually representing that eminent physicists have adopted his theories while none of them share in my objections. I can assure Dr. Carpenter that such is not the case. Only a few weeks ago one of the most eminent mathematical physicists of the present day stated to me that no one familiar with the elements of physics and mechanics, who would be at the trouble to make himself acquainted with Dr. Carpenter's theories, could ever adopt them.

JAMES CROLL

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* Phil. Mag. for March 1874, p. 170.

BIOLOGY AT CAMBRIDGE

ON the evening of Monday, 11th inst., Cambridge biologists mustered at least a hundred strong at the meeting of the Philosophical Society to hear a communication from Prof. Huxley, one of the honorary members of the Society, on the morphological conclusions to be drawn from the distribution of the cranial nerves, with especial reference to those of the seventh pair. Prof. C. B. Babington, F.R.S., president of the Society, occupied the chair. Prof. Huxley took occasion to refer in terms of the highest commendation to the researches of Stannius more than twenty years ago, on the morphological teaching to be derived from studying the distribution of nerves, and also spoke of the deductions drawn from nerve-supply by Gegenbaur, especially in his work on the "Skulls of Plagiostomous Fishes." Prof. Huxley sketched in considerable detail the distribution of the portio dura or seventh cranial nerve in man, and compared it with the homologous nerve in the frog, showing how the arrangements of branches, especially the course of the chorda tympani, which seemed anomalous in man, were a necessary consequence of perfectly obvious and natural arrangements in the lower vertebrates. He also demonstrated how the morphology of the parts might be learnt from such homologies; how a circuitous and apparently useless path taken by a nerve was full of meaning and instruction, and when studied in connection with facts of development and function would lead to an explanation which might be very much trusted. The relation of the tympano-eustachian tube to the bifurcation of the seventh nerve was dwelt upon, as leading to the identification of the comparatively small and simple auditory passage of the frog with the complex one of the mammal, and further to the homological identity of these passages with the spiracle of the Plagiostomes. The distribution of the fifth and seventh pairs of cranial nerves was held to agree with the view, suggested by development, that the trabecular arch is a pre-oral visceral arch, and that the pterygo-palatine is but an outgrowth of the mandibular arch.

The paper, which was illustrated by black-board drawing, with the professor's well-known aptitude, and which was a model of lucidity and careful reasoning, was loudly applauded. In a discussion which followed, Prof. Humphry drew attention to labours of his own having the object of showing the value of the teaching of nerve distribution. He acknowledged the strong case which was now made out in favour of the trabecular arch taking its position in the series of visceral arches, and thought that Prof. Parker's paper on the development of the pig's skull made it almost equally clear that the pterygo-palatine arch was similar in homology. It was also remarked that the same conclusions seemed deducible from Prof. Parker's paper on the development of the salmon, where the pterygo-palatine arch was distinct from the first and in all respects like the other visceral arches.

The practical class for the study of elementary biology, conducted by Dr. Michael Foster and Dr. Martin, is very successful this term. When thirty students entered last year the number was thought very large, and it was made up of men of several years who had previously had no opportunity of attending such a course. It was expected that a much smaller number would attend this year; but the large number of nearly forty have availed themselves of the course, and work proceeds in a most satisfactory and instructive fashion. Adequate superintendence is provided at all hours of the working day by the co-operation of four advanced students in addition to the lecturers. These are Messrs. P. H. Carpenter, Trinity College, A. M. Marshall, B.Sc., and Langley, St. John's College, and S. H. Vines, B. Sc., Christ's College.

G. T. BETTANY

NOTES

ON Tuesday, Sir Samuel Baker delivered the Rede lecture in the Senate House, Cambridge, before a numerous assemblage, which included all the leading men of the University in residence, and many ladies. The subject of the address was "Slavery," and Sir Samuel's narrative of his personal experiences in Africa was listened to with much interest.

IT is said to be in contemplation to confer honorary degrees at the Cambridge commencement upon Sir Bartle Frere, Sir Garnet Wolesley, Sir James Paget, and Prof. Helmholtz.

IT is stated that if the authorities of Owens College, Manchester, can show that they really require it, Government are prepared to make a considerable grant ot money to the College.

THE Founder's Medal of the Royal Geographical Society has been granted to Dr. Schweinfurth, and the Victoria Medal to Col. P. E. Warburton, who recently succeeded in crossing the interior of Western Australia.

BY later advices from Australia we learn that Major Warburton accomplished exactly what he set out to do. He traversed the continent from the MacDonnell Ranges to the coast north of

Nickol Bay, passing over 800 or 900 miles of ground never before trodden by the foot of white man. The expedition has been useful only in a scientific point of view; the country for nearly the whole distance is utterly worthless. Barren, scrubby, and in the last degree wretched, the explorers had the utmost difficulty in forcing their way through. With poor food for the greater portion of their dreary journey, with water often scarce, and little game, the brave band were reduced to the utmost extremities. For three months they had nothing to live on but dried camels' flesh, and as much roots and bulbs as they were able to gather.

IT is said that the king of Sweden has conferred upon Mr. Leigh Smith, the Arctic explorer, the Order of the Polar Star. Mr. Smith succeeded last spring, at his own expense, and with much difficulty, in rescuing the Swedish expedition, which had been caught by the ice in the preceding winter.

THE Albert Gold Medal of the Society of Arts has been awarded for the present year to Dr. C. W. Siemens, F.R.S.

THE German Emperor a few days ago at Wiesbaden, received Herr Rohlfs, the German explorer, who has just returned from the Lybian desert. It was by the Emperor's special command that the well-known traveller repaired to the palace and gave his Majesty an interesting account of his latest travels. The Emperor, as a further distinction, desired Herr Rohlfs to dine that day at the imperial table.

WE are glad to learn that, in accordance with the wish expressed at the Meteorological Congress held at Vienna in 1873, a commission has been nominated by the Imperial Academy of Sciences at St. Petersburg and by the Imperial Ministry of Marine, to prepare a project for the establishment of a central office for Maritime Meteorology in Russia, including a system of meteorological telegraphy and storm warnings. Prof. H. Wild, Director of the Central Physical Observatory, and Capt. M. Rikatcheff, Assistant in the same establishment, are appointed members of the commission.

M. PRJEWALSKY, a staff-officer of the Russian army, is about to publish an account of a journey in which he has successively explored Dzungaria, Koukou Noor, and Moupin. Like Armand David (NATURE, vol. x. p. 32), he brings back with him extensive collections. Insects hold a large place in both; those of Père David, said to be exceedingly interesting, have been presented to the Musée National, at Paris, where they have remained unnoticed by the French entomologists, one of whom says, that now "they will probably always remain unknown."

M. J. LIAGRE has been elected Perpetual Secretary of the Belgian Academy of Science, in succession to the late M. A. Quetelet.

A GEOLOGICAL excursion on a somewhat extended scale has been proposed, to those localities in the Swiss Alps which have become household words amongst those who have studied the changes of the earth's surface, and the action of ice and water more especially. A gentleman whose local knowledge is undoubted has been requested to act as cicerone to the party, and to deliver discourses upon the more interesting spots. He has accepted the first task, but wishes to secure the kind offices of an indigenous geologist for the second. It is hoped to arrange for a large party of ladies and gentlemen to start early in August and be absent for a month. This is the first time the interests of Science will be added to the enjoyments of a summer's holiday, with the exception of the short excursions near home of the Geologists' Association.

THE President of the Institution of Civil Engineers and Mrs. Harrison held a reception on Tuesday evening in the western gallery of the International Exhibition, at which over two thousand guests were present. In addition to the picture galleries and rooms containing machinery in motion, the west quadrant was open, and in it were placed illustrations of recent scientific inventions specially lent for the evening. With the exception of Mr. Crook's experiments showing attraction and repulsion accompanying radiation, and Tisley and Spiller's compound pendulum apparatus, all were applications of scientific inventions to the wants of life, if wicked war may be included among our wants, for Sir W. Armstrong, and other firms, sent models of appliances for the hydraulic mounting of large guns, whereby they can be placed in position with ease. One of the most recent applications of electricity is to a self-recording "way-bill" of omnibuses. An apparatus brought out by Messrs. Whitehouse and Clark counts up once every minute the number of passengers in the omnibus and prints this number and the exact time in plain figures. Each seat is separate, and the weight of the passenger on the seat brings the wire from that seat in communication with the recorder. The instrument also records the speed of the omnibus at every moment of the journey, and shows the exact time of arrival and departure from each station. The cost is said to be but a few shillings a week, but it does away with the need of a time-keeper. A sample was exhibited of bills made May 15, in Liverpool, showing that the invention is practicable as well as ingenious. Nearly all other models were of docks, lighthouses, or railway appliances.

AT a meeting of the Sedgwick Memorial Committee held at Cambridge on the 12th inst., the treasurers, Mr. Vansittart of Trinity, and Mr. Ewbank of Clare, announced that more than 10,000*l.* had been promised, of which 9,000*l.* had been received. The money is to be expended in the erection of a Geological Museum, to be called the Sedgwick Museum. After discussion it was agreed that the time had arrived when it is desirable that the University should take the subject into consideration. The chairman, Prof Humphry, was desired to communicate the resolution to the Vice-Chancellor, with a request that he would bring the subject under the consideration of the Council of the Senate.

ON Thursday last in the House of Commons Lord E. Fitzmaurice gave notice that in the event of the Royal Commission reporting on a sufficiently early day before the close of the session, he would call attention to the subject of University reform, and move a resolution.

COUNT WILCZEK, we learn from the *Geographical Magazine*, has announced his readiness to give a reward of 1,000 florins (100*l.*) to anyone who will bring home any news of the Austro-Hungarian Arctic Expedition. The *Tegethoff* steamer, with the members of the Expedition on board, was last heard of on Aug. 21, 1872, on the north-west coast of Novaya Zembya, in about 76° N. lat., when Count Wilczek himself parted company with them and sailed southward in his yacht *Isbjörn*.

A LETTER from the *Daily News* correspondent with H.M.S. *Challenger* gives some account of the work done by that ship between Simon's Bay and Melbourne. The usual sounding, dredging, and trawling operations were carried on with excellent results; many new specimens have been obtained by the dredge. The ship was at Kerguelen's Island on January 7, and stayed about the island during the month of January, making careful surveys and observations, and collecting specimens both from the sea and land. Previous to the ship's departure from Christmas Harbour, Kerguelen, a cairn was built, and papers of instruction, &c. for the Transit of Venus party left in it. On February 11 the first iceberg was seen when making for Heard Island, and from this time till the beginning of next month, ice bergs and drift-ice were met with in large quantities, the ship making one or two narrow escapes; on Feb. 24 the ship was quite close upon the so-called "Termination Island," but no sign of land was seen at all. On March 17 the *Challenger* anchored near Melbourne, all well.

A TRAIN arrived at Algiers from Oran on the 18th inst., six hours behind time, having been delayed by a thick layer of grasshoppers which covered the rails.

THE first meeting of the Board of Governors of the Yorkshire College of Science was held in the Philosophical Hall, Leeds, on April 30. Dr. Heaton was called upon to preside. The business of the meeting was the election of the president, treasurer, council, and auditor for the ensuing year, also the appointment of six endowed grammar schools and ten institutions, each of whose governing bodies should elect a Governor of the College. Lord F. C. Cavendish, M.P. and Mr. W. B. Denison were respectively elected president and treasurer of the College. The following grammar schools were placed in Schedule A:—Leeds, Bradford, Batley, Halifax, Wakefield, and Giggleswick. The institutions placed in Schedule B were the Philosophical Societies at York, Leeds, Bradford, Halifax, Sheffield, and Huddersfield, the Clothworkers' Company of the City of London, the West Riding Coalmasters' Association, the Cutlers' Company, Sheffield, and the Trustees of Ackroyd Charity. Each of these bodies is invited to nominate a member of the Board of Governors.

THE *Times of India* states that Dr. David Wilkie has been appointed by the Government of India to conduct a scientific investigation into the nature, pathology, and causation of the fever prevailing in the Burdwan and Hoogly districts. He is to work in communication with Dr. Lewis and Dr. Cunningham, and under the direction and general superintendence of the Sanitary Commissioner with the Government of Bengal.

UNDER the direction of Mr. Liversidge, Professor of Geology and Lecturer in Practical Chemistry, the Laboratory of the Sydney University is being improved in a way to make it similar to the Laboratory of the Royal School of Mines and the University of Cambridge, and to afford appliances for the proper conduct of the exercises in practical chemistry.

MR. WILLIAM H. DALL resumed his Alaskan explorations under the U. S. Coast Survey, about April 20, at which date he expected to sail for Sitka and more northern points. It is probable that his labours during the present season will be in the neighbourhood of Cook's Inlet and the peninsula of Alaska, and the coast of the mainland as far as the islands of Nunivah and St. Michael's. His duties are to complete a coast pilot of the territory, and to make careful magnetical and other observations. Should his regular work permit, he hopes to make large collections in natural history and ethnology, in continuation of those of previous seasons, and transmitted through the Coast Survey Office to the National Museum at Washington, and which have done him and the Survey so much credit.

HEFT V. of Petermann's *Mittheilungen*, contains Contributions to the climatology and meteorology of the East Polar Sea, by Prof. Mohn; an account of some of the results of Gerhard Rohlf's expedition into the Lybian desert, with a map; and a German translation of the journal kept by Jacob Wainwright, while marching with Livingstone's body from Central Africa to Zanzibar. A copy of this journal was obtained by the late Richard Brenner, the African traveller and Austrian Consul at Zanzibar.

THE additions to the Zoological Society's Gardens during the last week include a Crested Curassow (*Crax alector*) from Guiana, presented by Mr. G. Bruce; a Ring-necked Parakeet (*Palæornis torquata*) from India, presented by Mrs. A. de Normanville; a Coati (*Nasua nasica*) from South America, presented by Miss E. Waller; a Common Paradoxure (*Paradoxurus typus*) from India, presented by Mr. G. R. Colbeck; two Muscovey Ducks (*Cairina moschata*) from Monte Video, presented by Mr. S. J. Oliff; a Koodoo (*Strepsiceros kudu*) from Africa, deposited.

THE METEOROLOGICAL CONGRESS AT VIENNA *

II.

WITH reference to the organisation of a system of meteorological observations on the Chinese coasts, for advice regarding which the Congress was applied to, a report was adopted setting forth the general principles of organisation suited to the circumstances of China.

In addition to the above, General Myer, as commissioned by the War Department of the United States, proposed that with a view to their exchange at least one uniform observation of such character as to be suitable for the preparation of synoptic charts be taken and recorded daily and simultaneously at as many stations as practicable throughout the world. This proposal the conference adopted, and, as the readers of NATURE are aware, is now in operation.

On these various subjects much valuable information will be found in the discussions in the Reports of the Committees, and in the communications printed in the Appendices, particularly on the subjects of weather telegraphy, sheet lightning, atmospheric electricity, ozone, clouds, atmometers, rain-gauges, and the protection of thermometers.

In the review of the Leipsig Conference (NATURE, vol. viii. p. 342) a hope was expressed with reference to the protection of the thermometers, which is really the vital question of meteorology, that the Vienna Congress would face it, seriously discuss it, and either arrive at some decision, or at least suggest some steps to be taken that might ultimately lead to the uniformity which is so imperatively called for. Unfortunately this has not been done. We say unfortunately, for scarcely two of the head observatories in the British Isles and on the Continent, where continuous or hourly observations are recorded, could be named at which there is uniformity in the protection of the thermometers as respects the box in which they are placed, height above the ground, and position with reference to walls and other surrounding objects. Now till uniformity in the position and exposure of the thermometers be obtained, there can be no comparableness in the results, and consequently the observations are of little value as data for the determination of what must be regarded as the most important fundamental facts on which the science rests, viz. the diurnal and seasonal march of the temperature and humidity of the atmosphere. It is only from the range of the temperature and the humidity of the atmosphere of different regions as ascertained by observations made on a uniform method that we are furnished with physical data for the scientific treatment of such questions as the daily fluctuations of the barometer, and the changes and movements of the atmosphere generally.

Prof. Wild's paper on the exposure of thermometers (p. 77) we recommend to the careful consideration of meteorologists. His observations, instituted at the Pulkowa Observatory at heights of 6¼ ft., 52 ft., and 86 ft., are, as far as we are aware, the best that have yet been made for the purpose of disclosing the influence which mere height, as such, has on the temperature. The thermometers were *placed on a scaffolding constructed of timber lightly put together, and standing in an open field*, being in these essential points in striking contrast with those placed for a similar object on the Chinese pagoda in the Royal Gardens at Kew, it being evident that observations made with thermometers placed like those at Kew will give results which possess little, if any, value in an inquiry touching the vital question of the position and exposure of thermometers.

From the small differences among the mean temperatures he obtained at the different heights, Wild concludes that the height of thermometers above the ground need not necessarily be the same, but may vary between 6 ft. and 33 ft. The differences he obtained as regards mean temperature, though by no means insignificant, are doubtless small; but when we regard the maxima and minima and the observations at particular hours, which in their practical bearings are so important, the influence of height becomes well marked. Hence, if in any meteorological system uniformity as respects height be disregarded, the results so obtained fail to supply the data necessary for a satisfactory comparison of climates. This condition is all the more indispensable when the thermometers are placed at a height of 4 ft. above the ground, at which they should be placed as being the height which gives the best results as regards the application of meteorology to human mortality and other important questions affecting animal and vegetable life.

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* Continued from p. 18.